Principles of Corporate Finance

Written exam (proctored online) - Sept 10, 2020

THE EXAM LASTS 1 HOUR

THOSE WHO HAVE PRESENTED IN CLASS MUST ANSWER THE 2 NUMERICAL QUESTIONS.
ALL OTHERS HAVE 15 MINUTES MORE AND MUST ANSWER ALSO THE OPEN QUESTION.

Question 1 (numerical)

Consider an E(ntrepreneur) who seeks funding for a risky project requiring $I = 50$ as investment at $t = 0$ and returning a cash flow $X = \{40, 100\}$ at $t = 2$. At $t = 1$ E can choose (not being observed) between two projects: project H has a greater success probability $p_H = 0.8$, while project L has a smaller probability $p_L = 0.3$ of success. However project L guarantees to E a private benefit $B = 15$.

1. Check that the NPV when E chooses H is positive.
2. Consider financing the project by issuing a stock leaving a proportion $\beta \in (0, 1)$ to investors: will E choose H?
3. Consider financing the project with risky debt, i.e. a debt contract with face value $40 < D < 100$: will E choose H?

Question 2 (numerical)

E owns liquidity A and seeks external funding for an investment that requires $I = 50$ at $t = 0$ and that returns $X = \{10, 100\}$ at $t = 2$. E can choose between two projects: a good project H and a bad project L. The success probability is $\Pr X = 100 = p$; project H has a greater success probability $p_H = 0.8$, while project L has $p_L = 0.3$. However project L guarantees to E a private benefit $B = 40$.

1. Compute the NPV of the project H.
2. E raises $(I - A)$ by issuing a bond that repays a face value R_u to investors. Write the incentive constraint for E to choose project H and compute his maximum pledgeable income (constraint on R_u).
3. Write the investors' rationality constraint and find the minimum value R_u, assuming that E chooses project H. Find the minimum threshold for A, call it $\bar{A}$, for which E manages to raise external financing.
4. The bank monitors at cost $c = 15$, reducing as a consequence the private benefit from B = 40 to $b = 20$. Assume an E who is credit rationed by investors, i.e. with $A < \bar{A}$. E asks funding exclusively to a bank and promises to repay R_m at t = 2. Which is the minimum threshold for A, call it $\underline{A}$, to obtain a loan from the bank?
5. Assume now funds A are uniformly distributed between 0 and 100. Compute the percentage of firms that are credit rationed, those that are financed by financial markets, those financed by the banks and those that self-finance the investment.

Question 3*

Define the "arms' lenght" finance. Which are the main differences with respect to the other types of external finance?